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EXAMINER

SAVAGE, JASON L

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

***Advisory Action***

Applicant argues that while Yoshiyuki teaches that the hardness of the HAZ and base metal should be similar, it does not teach or suggest regulating the hardness difference between the weld metal and base metal. While Yoshiyuki does not explicitly recite the relative hardness difference between the weld metal and the base metal, it teaches that it is known in the prior art to regulate a small difference hardness of the weld metal and HAZ (par[0003]). As such, it would have been obvious to one of ordinary skill in the art following the teachings of Yoshiyuki to have formed the welded plates wherein the hardness difference between the base metal and the HAZ is small, and further wherein the hardness difference between the HAZ and weld metal is small. The thus formed welded component would have a difference in hardness between the weld metal and the base metal which is small.

Regarding the limitation that the relative difference is within the claimed range, since Yoshiyuki teaches "small" differences in hardness between the base metal and HAZ which are less than 4% (table 3). As such, it would be reasonable to expect the small difference between the HAZ and weld metal would be on the same order of magnitude and the resultant overall difference between the base metal and weld metal would fall within the claimed range between 70-110%. One of ordinary skill in the art would be motivated to control both the hardness difference between the base metal, HAZ and weld metal since it is taught regulating these properties provide improved

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properties such as fatigue strength, weldability and reduction of the softening in the HAZ.

Applicant also argues that the cited teaching by the Examiner that Yoshiyuki teaches steel plates having a thickness over 50mm in paragraph [0037], actually recites a thickness of 50 mm or less and the thicknesses of the plates in Table 3 are all 50 mm or less. However, Yoshijuki further teaches that the steel plates may have a thickness of 50 mm or more in lines 3-4 of the same paragraph [0037]. In the alternative, it would have been obvious to one of ordinary skill to have forming welded structures of thick steel plates having any conventional thickness including having a thickness over 50 mm with a reasonable expectation of success.

Applicant also argues that the prior art does not teach the claim limitation of limiting the width of the weld metal to the claimed ratio with respect to the sheet metal thickness. Applicant argues Shigeru's disclosure of regulating the width of the region more softened than the base metal is directed to the softened HAZ region and not the weld metal itself. Applicant also states that Tomomasa is directed to a different technology which would not be pertinent to the present invention or that disclosed by Yoshiyuki. However, both Shigeru and Tomomasa generally disclose that it is known in the art to limit the thickness of the welded portion including the weld metal itself to have a thickness which is smaller than the thickness of the metal plate. As such, it would have been to one of ordinary skill to have formed the welded zone component such as the weld metal having a width smaller than the plate thickness with a reasonable expectation of success.

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Applicant concludes that none of the cited references including Hasegawa teach or suggest a steel having the recited hardness of the weld metal. However, for the reasoning set forth above, the prior art is seen to teach the recited claim limitation.

/Jennifer McNeil/

Supervisory Patent Examiner, Art Unit 1794